

# VARKON



800-621-1253 IN ILLINOIS CALL: 800-572-1324



3401 N. California Ave., Chicago, IL 60618 Cable Address: WILCOIN, CHICAGO (312) 267-2240

## SPECIAL CONSIDERATIONS WHEN REPLACING CIRCUIT BOARDS

**CPU Board** 

- Revision level 7 CPU Boards (batteries located on lower left corner at board) or later boards must be used.
- 2. Must be equipped with blue-labeled Flipper ROMs and blue-labeled Game ROMs.
- 3. Jumpers W3, W10, W11, W14, W17, W19, W20, and W22 must be connected. Jumpers W4, W9, W12, W15, W16, W18, W21, and W23 must be removed. With the exception of W25, (Factory Setting Jumper) all other jumpers are not changed.

**Sound Board** 

Must be jumpered for ROM operation and be equipped with Sound ROM 10. (Jumpers W2, W5, W7, W9, W10, W12, and W15 connected; W3, W4, W6, W11, and W13 removed).

**Power Supply Board** 

- 1. Model D 8345 board required (equipped with relay).
- 2. Fuse F4 (10A SB) for flipper solenoids must be installed.

**Display Boards** 

Model C 8363 Master Display and 7-digit Slave Displays required.

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### Game Setup

- 1. Open cash box door and remove cash box.
- 2. Open cash box and remove play balls for insertion in game.
- Open rear door and remove power cord; insert it in notch cut in bottom of door frame.
- 4. Place one play ball into Upper Playfield outhole.
- 5. Open coin door.
- 6. Reach through coin door & nemove two wing nuts (marked by hanging tags) holding Lower Playfield in position.
- Place one play ball in Lower Playfield and replace Lower Playfield with wing nuts.

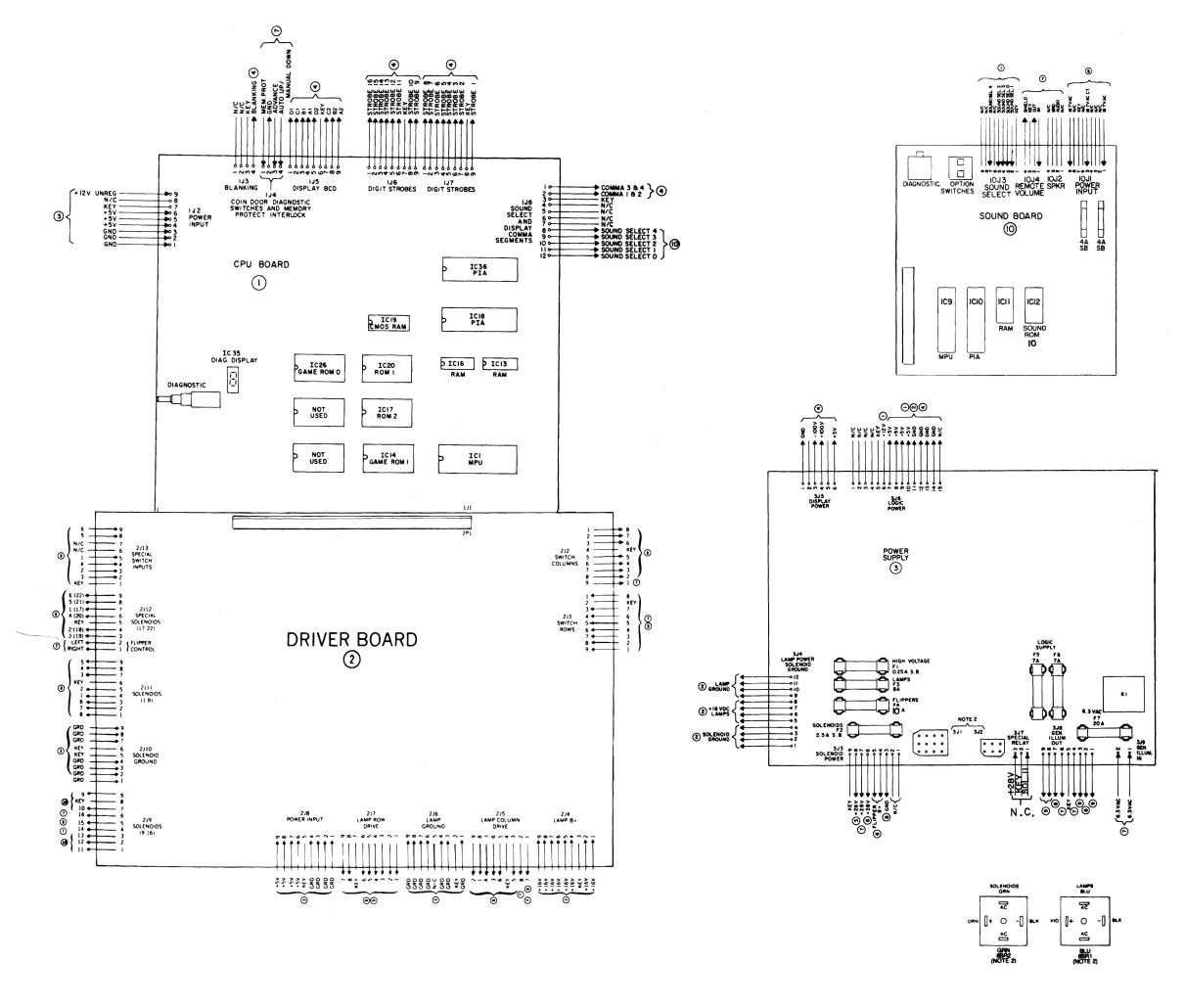
#### Inspection

- 1. Check all cable connectors for loose wire terminations. Reseat any loose wires by pushing in on terminal.
- 2. Push on all connectors attached to Master Display, CPU, Power Supply, Driver, and Sound Boards, and check terminations on Power Input Board capacitor and bridge rectifiers at bottom of cabinet.
- 3. Gently press on all socketed IC packages on circuit boards.
- 4. Check all fuses: 2 on Sound Board, 7 on Power Supply Board, and line fuse on Power Input Board (on cabinet floor).
- 5. Push on connectors attached to Slave Display Boards.
- 6. Check coin door interlock switch and diagnostic switches wire terminations.

#### Power Turn-On

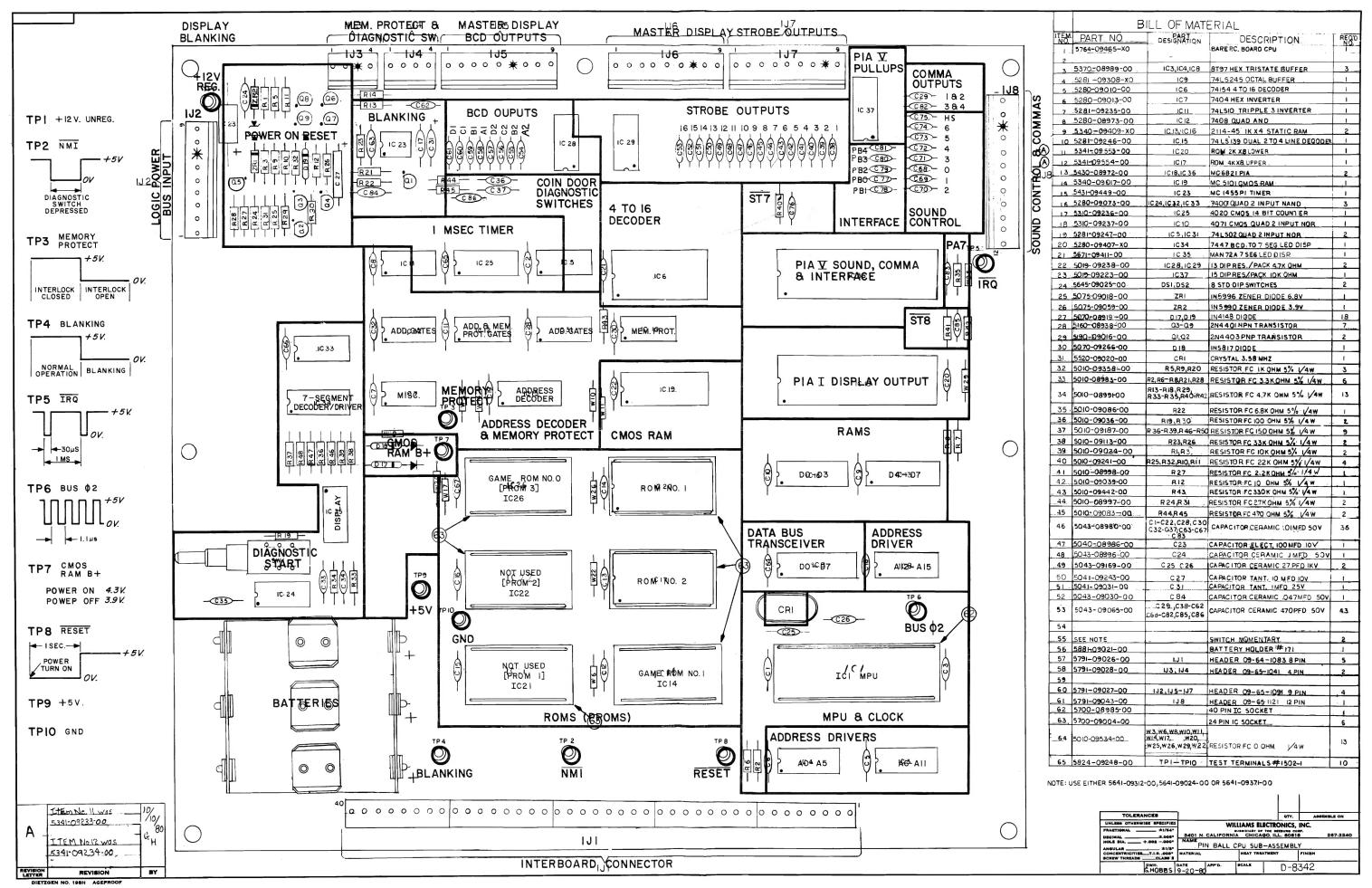
CAUTION - This game must be plugged into a properly grounded outlet to prevent shock hazard and to ensure proper game operation. DO NOT use a "cheater" plug to defeat the ground pin on the line cord, and DO NOT cut off the ground pin.

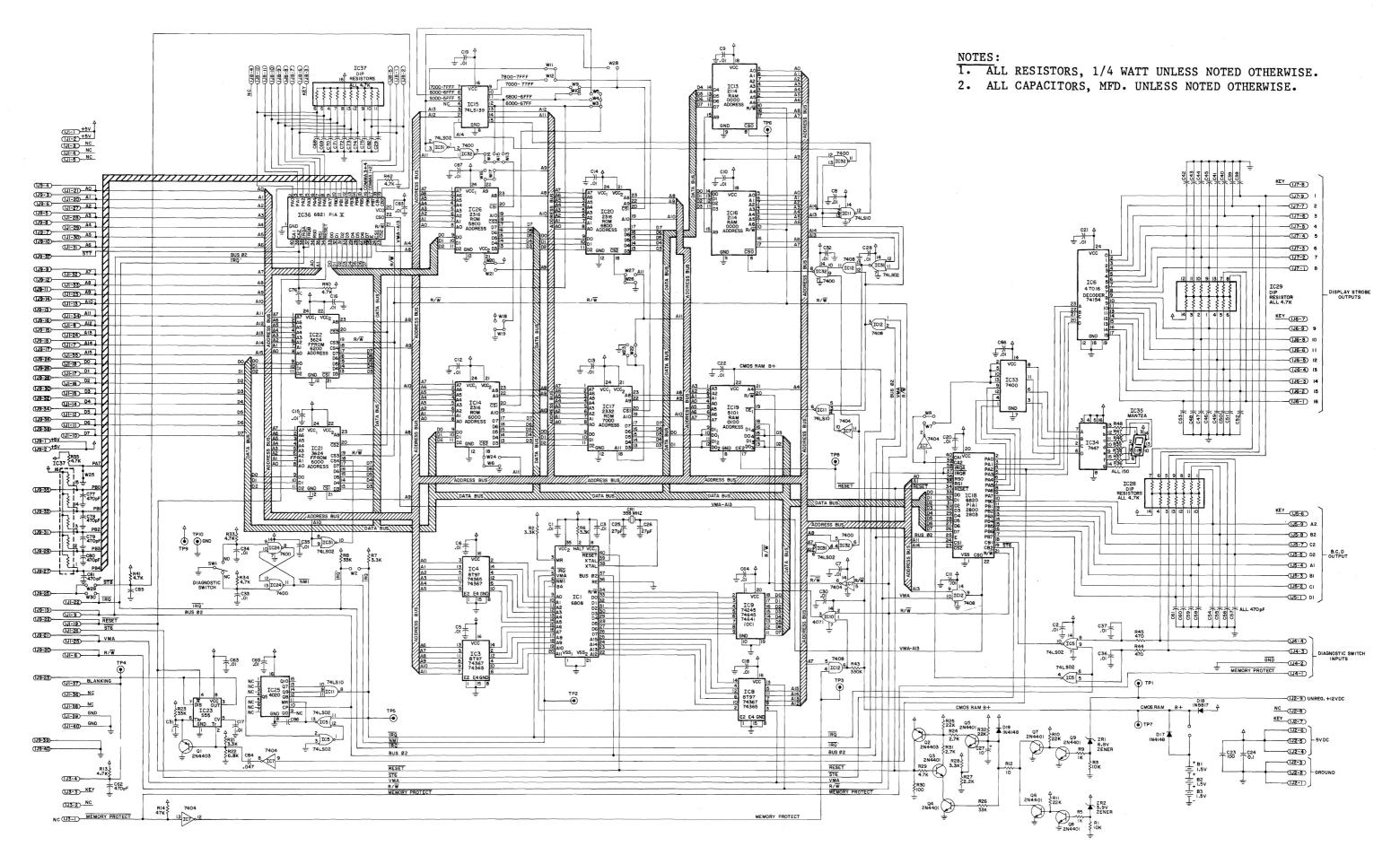
- 1. Carefully inspect rear door printed circuit boards and displays, cabinet wall printed circuit boards and cabinet floor Power Input Board to see they are securely mounted in place.
- 2. Close and lock rear door, cash box door, and coin door.
- 3. Turn on game using toggle switch located where power cord notch is cut.

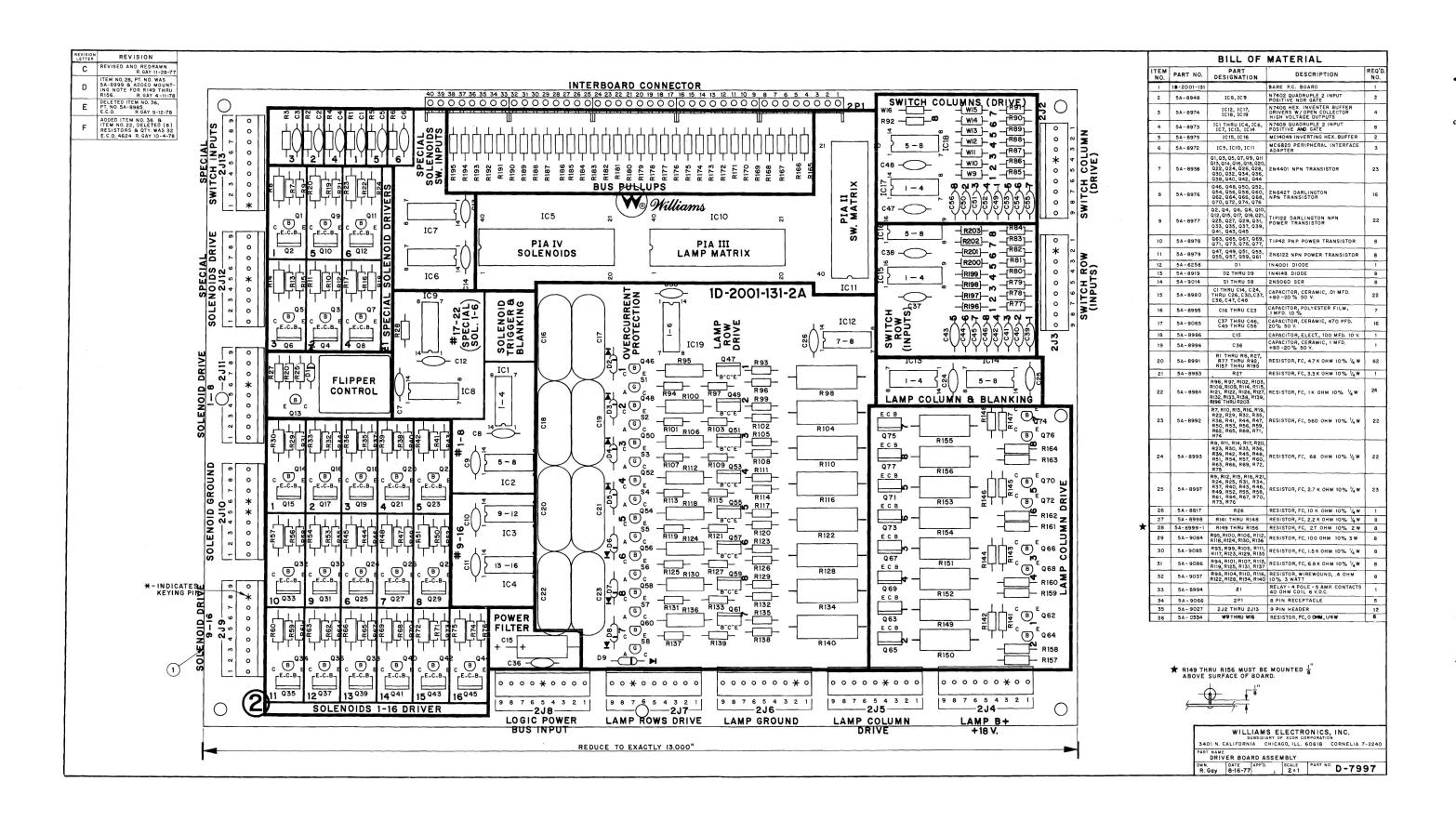


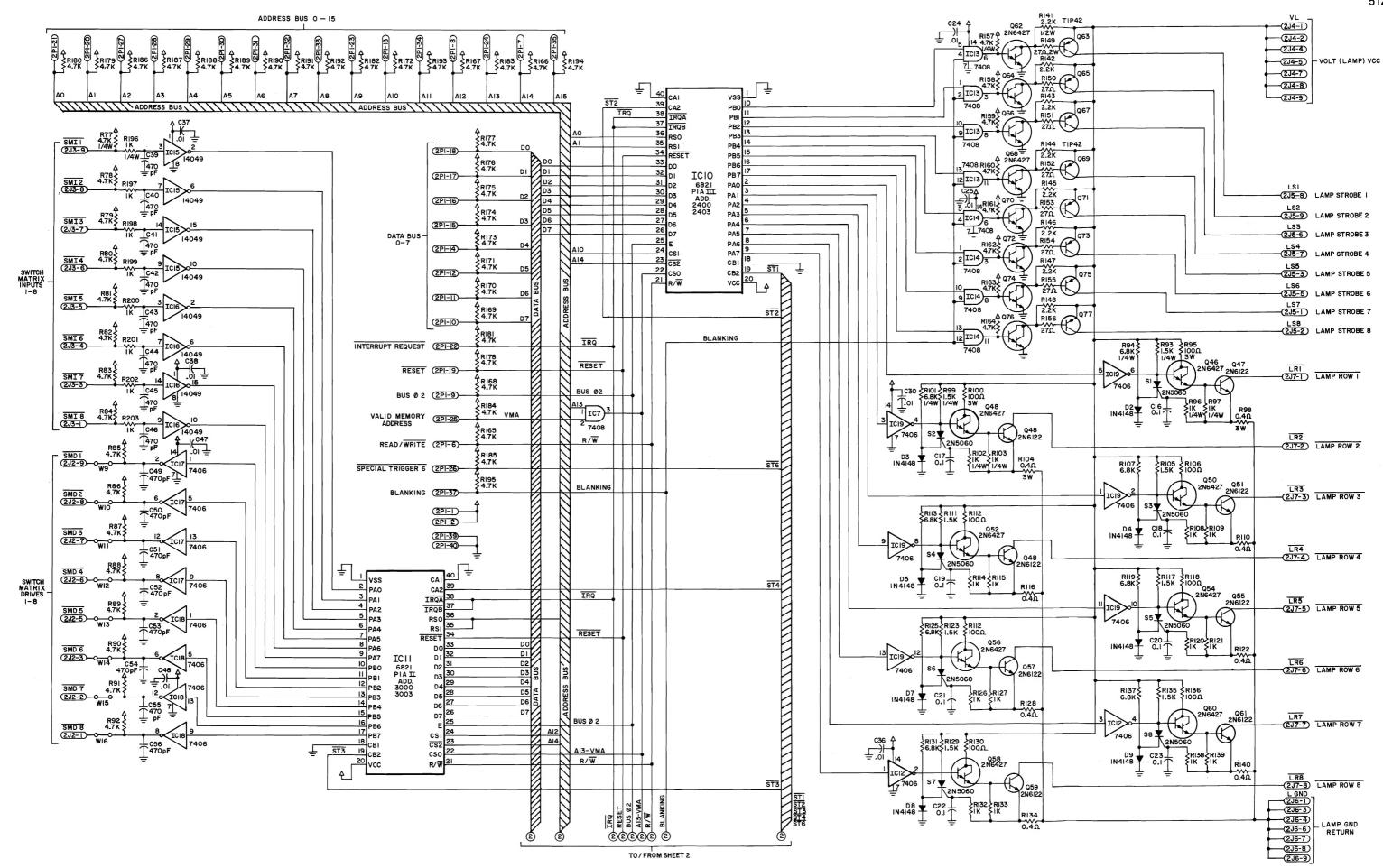
## NOTES:

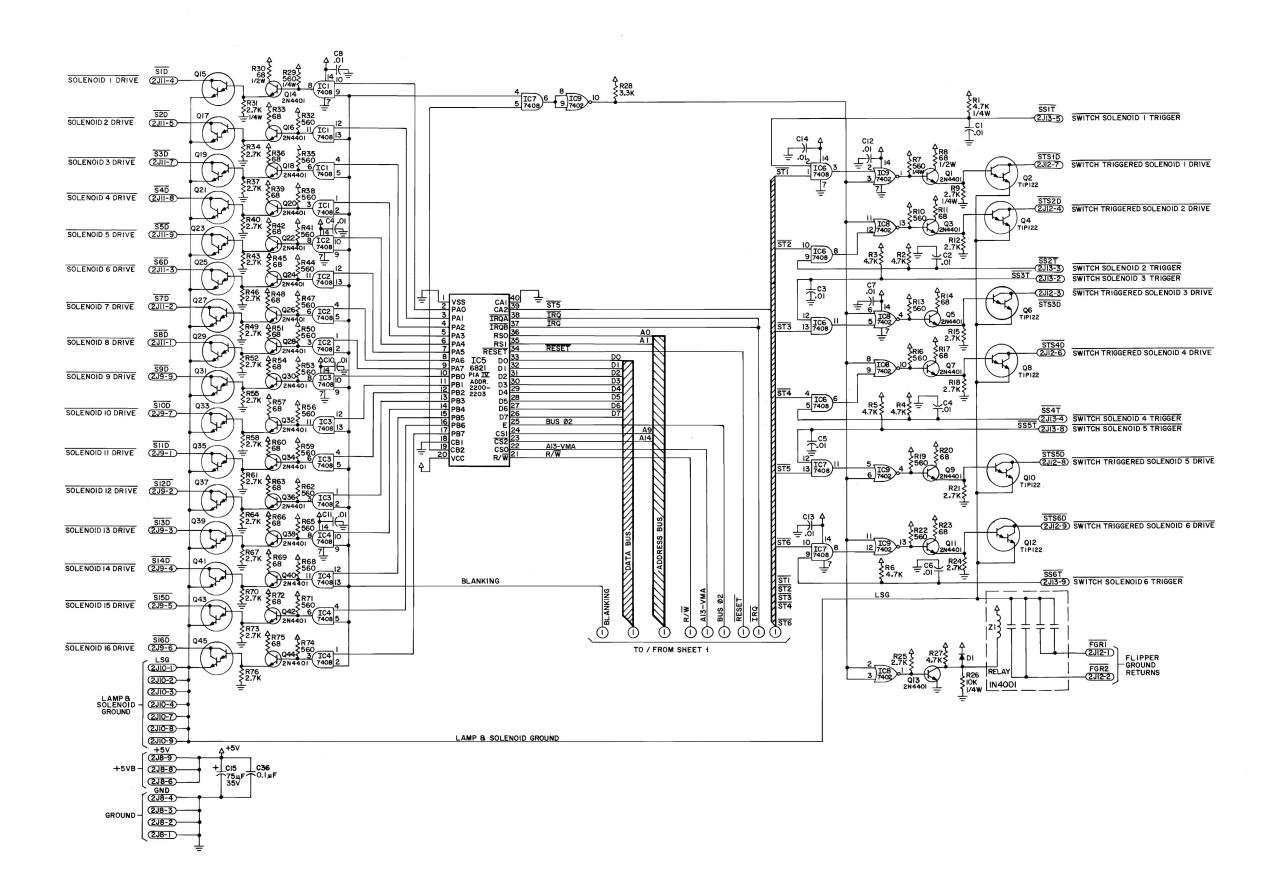
- 1. CONNECTIONS ARE INDICATED BY CIRCLED NUMBERS AS FOLLOWS:
  - (1) CPU BOARD
  - 2 DRIVER BOARD
  - (3) POWER SUPPLY BOARD
  - (4) MASTER DISPLAY BOARD
  - (5) SLAVE DISPLAY BOARD
  - (6) CONTROL PANEL
  - 7 CABINET
  - 8 PLAYFIELD
  - (9) INSERT BOARD
  - (10) SOUND BOARD
  - (1) NOT ASSIGNED
- 2. REFER TO POWER WIRING DIAGRAM FOR CONNECTIONS TO 3P1.

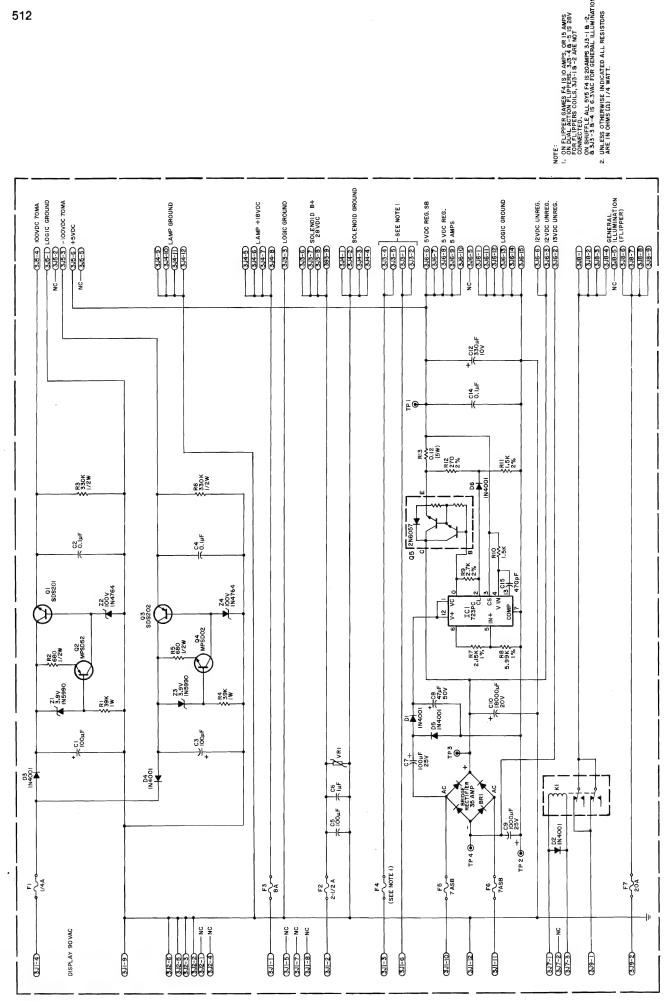




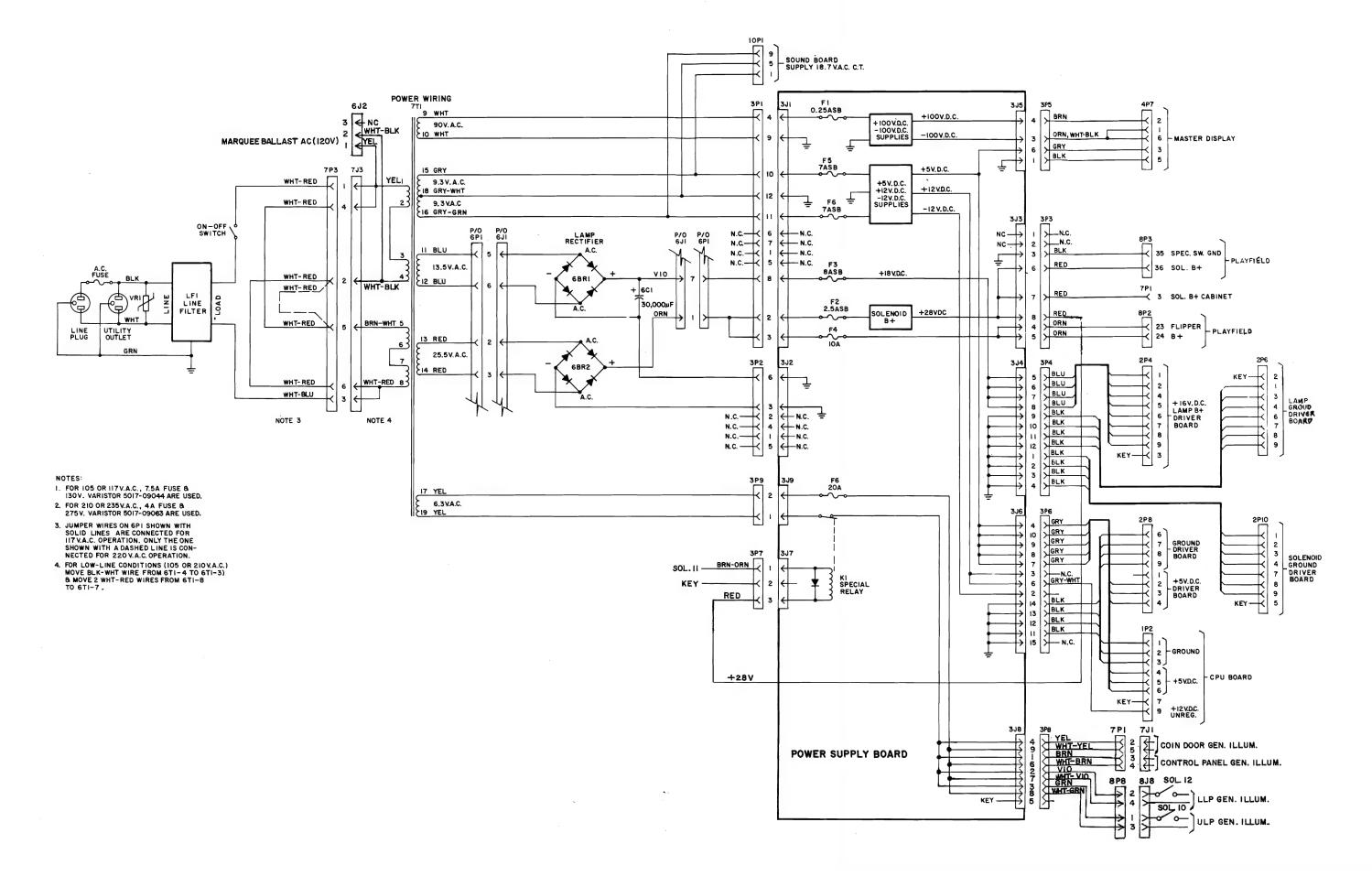




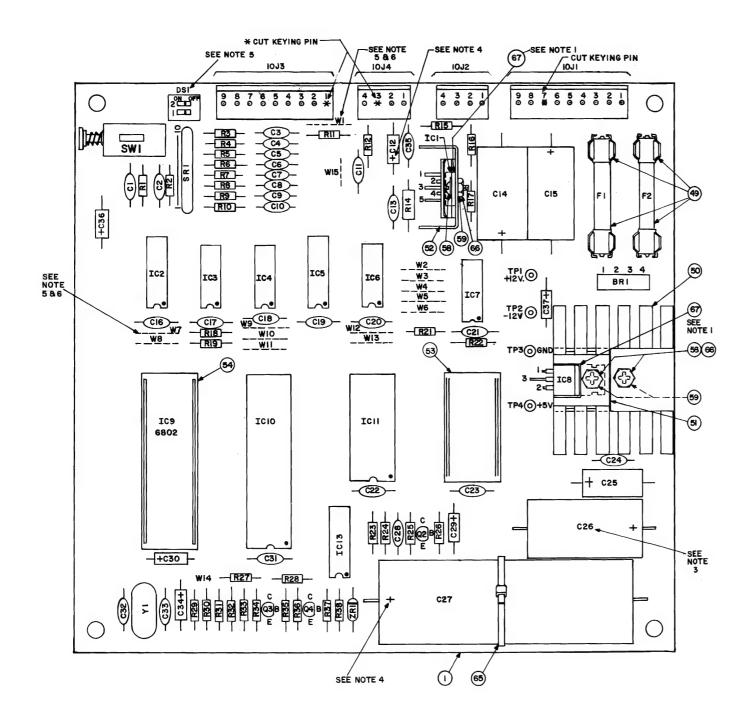




Power Supply Assembly and Schematic Diagrams



14



BILL OF MATERIAL

		BILL	OF MATERIAL	
ITEM	DADT NO	PART	DECCODEDT ON	REQ'D.
NO.	PART NO.	DESIGNATION	DESCRIPTION	NO.
1	01-2 01-146-6		BARE P.C. BOARD REV F	1
2	5370-09156-00	IC1	TDA 2002 V AUDIO AMPLIFIER	1
3	5280-09012-00	1C2	7442 BCD-DEC DECODER	1
4	5280-09073-00	IC3	7400 QUAD 2 INPUT NAND	1
5	5280-08973	1C4	7408 QUAD 2 INP. AND GATE	1
6	5310-09153-00	IC5	4050 BUFFER	1
7	5310-09154-00	106	4068 8 INPUT NAND GATE	1
8	5310-08971-00	IC7	4069 HEX INVERTER	1
9	5250-09157-00	IC8	7805 5 VOLT REG. W/TO 220 CASE	1
10	5430-08972-00	IC10	6821 P.I.A.	1
11	5340-09003 <b>-</b> 00	IC11	6810 RAM	1
12	5371-09152 <b>-</b> 00	IC13	1408 D/A CONVERTER	1
13	5160-08938 <b>-</b> 00	Q2, Q3, Q4	2N4401 NPN TRANSISTOR	3
14				
15	5075-09018-00	ZR1	IN5996A 6.8V ZENER DIODE	1
16	5400 00757 001		MD 4 000 /71/057	
17	5100-09357-00)	BR1	MDA 200/3N253	1
18	5100-09158-00)	Y1	BRIDGE RECTIFIER	0
	5520-09020-00		3.58 MHz CRYSTAL	
19	5010-08991-00	R1,R18,R19,R21,R22,	RESISTOR, FC, 4.7K OHM, 5% 1/4 WATT	9
20	5010-09036-00	R27,R30,R31, R32 R2 thru R10	RESISTOR, FC, 100 OHM, 5% 1/4W	9
21	5010-09036-00	R12,R15,R28,R36,R38	RESISTOR, FC, 100 OHM, 5% 1/4W	5
22	5010-09181-00	R14	RESISTOR, FC, 1 OHM, 10% 1/2 WATT	1
23	5010-09161-00	R16	RESISTOR, FC, 2.2 OHM, 5% 1/4 WATT	i
24	5010-09361-00	R17	RESISTOR, FC, 220 OHM, 5% 1/2 WATT	ì
25	3010 03301 00	13.17	11201010N, 10, 220 0111, 30 1,2 1,711	•
26	5010-08983-00	R23, R24, R26	RESISTOR, FC, 3.3K OHM, 5% 1/4 WATT	3
27	5010-09179-00	R25	RESISTOR, FC, 3.3M OHM, 5% 1/4 WATT	1
28	5010-09035-00	R29	RESISTOR, FC, 47K OHM, 5% 1/4 WATT	1
29	5010-09034-00	R33, R35, R37	RESISTOR, FC, 10K OHM, 5% 1/4 WATT	3
30	5010-09039-00	R34	RESISTOR, FC, 10 OHM, 5% 1/4 WATT	1
31	5043-08980-00	C1, C16 thru C23, C31	CAPACITOR, CER01 MFD. 50V. +80%, -20%	10
32	5043-09065-00	C2 thru C10	CAPACITOR, CER. 470 PFD. 50V. +-20%	9
33	5043-09345-00	C11	CAPACITOR, CER001 MFD. +-20% 100V.	1
34	5040-09365-00	C12, C30, C36	CAPACITOR, ELECT. 1 MFD. 63V10 +50%	3
35	5043-08996-00	C13, C24, C35	CAPACITOR, CER1 MFD. 50V. +-20%	3
36	5040-09165 <b>-</b> 00	C14	CAPACITOR, ELECT. 1,000 MFD. 16V. +-20%	1
37	5040-09164-00	C15	CAPACITOR, ELECT. 470 MFD. 10V. +-20%	1
38	5040-08986-00	C25	CAPACITOR, ELECT. 100 MFD. 10V. +-20%	1
39	5040-08893-00	C26	CAPACITOR, ELECT. 1,000 MFD. 25V. +-20%	1
40	5040-09376-00	C27	CAPACITOR, ELECT. 4700 MFD. 16V. +-20%	1
41	5043-09180-00	C28	CAPACITOR, CER. 47 PFD. 1K V. +-20%	1
42	5040-09343-00)	C29	CAPACITOR, ELECT. 10 MFD. 20V	1
43	5043-09169-00	C32, C33	CAPACITOR, CER. DISC, 27 PFD. 1KV. +-10%	2
44	5041-09163-00	C34	CAPACITOR, TANTALUM 2.2 MFD. 15V. +-20%	1
45	5041-09031-00	C37	CAPACITOR, TANTALUM 1 MFD. 25V. +-20%	1
46	5641-09658-00)	SW1	MOMENTARY SWITCH SPDT	1
47 48	5645-09330-00 5731-06314-00	DS1 F1 F2	2 STD, DIP SWITCH 4 AMP SLOW BLOW FUSE	1 2
48 49	5732-09178-00	F1, F2	FUSEHOLDER	4
50	5705-09172-00		HEAT SINK THERMALLOY #6072B	1
51	5705-09172-00		HEAT SINK THERMALLOY #6071B	1
52	5705-09199-00		HEAT SINK THERMALLOY #6030	1
53	5700-09004-00		24 PIN SOCKET	1
54	5700-08985 <b>-</b> 00		40 PIN SOCKET	1
55	5791-09027-00	10J1, 10J3	9 PIN MALE CONNECTOR 09-65-1091	2
56	5791-09028-00	1031, 1035	4 PIN MALE CONNECTOR 09-65-1041	2
57	2,7, 0,020 00	1002, 1007		-
58	4006-01003-06		6-32x3/8" P-PH-S	3
59	4406-01117-00		6-32 HEX NUT	3
60	5010-09534-00		O OHM RESISTOR	A/R
61	5824-09248-00	TP1 THR TP4	TERMINAL #1502-1	4
62	5010-09363-00	R11	RESISTOR, FC, 5.6K OHM 5% 1/4 WATT	1
63				
64	5019-09362-00	SR1	RESISTOR, 4.7K OHM 10 PIN SIP	1
65	03-7520-1		TIE WRAP	1
66	4703-00007-00		#6 EXT. LOCKWASHER	3
67	20-9229		THERMAL COMPOUND	•01

 $\frac{\text{NOTES:}}{1 \cdot \text{ USE}}$  THERMAL COMPOUND BETWEEN IC1 AND IC8, AND HEAT SINKS.

2. CAUTION: AVOID STATIC DISCHARGE DAMAGE TO MOS LOGIC.

3. SYMBOLS SHOWN ON COMPONENTS ARE FOR REFERENCE ONLY. DO NOT SCREEN OR STAMP.

4. OBSERVE INDEX MARK OF ALL INTEGRATED CIRCUITS;

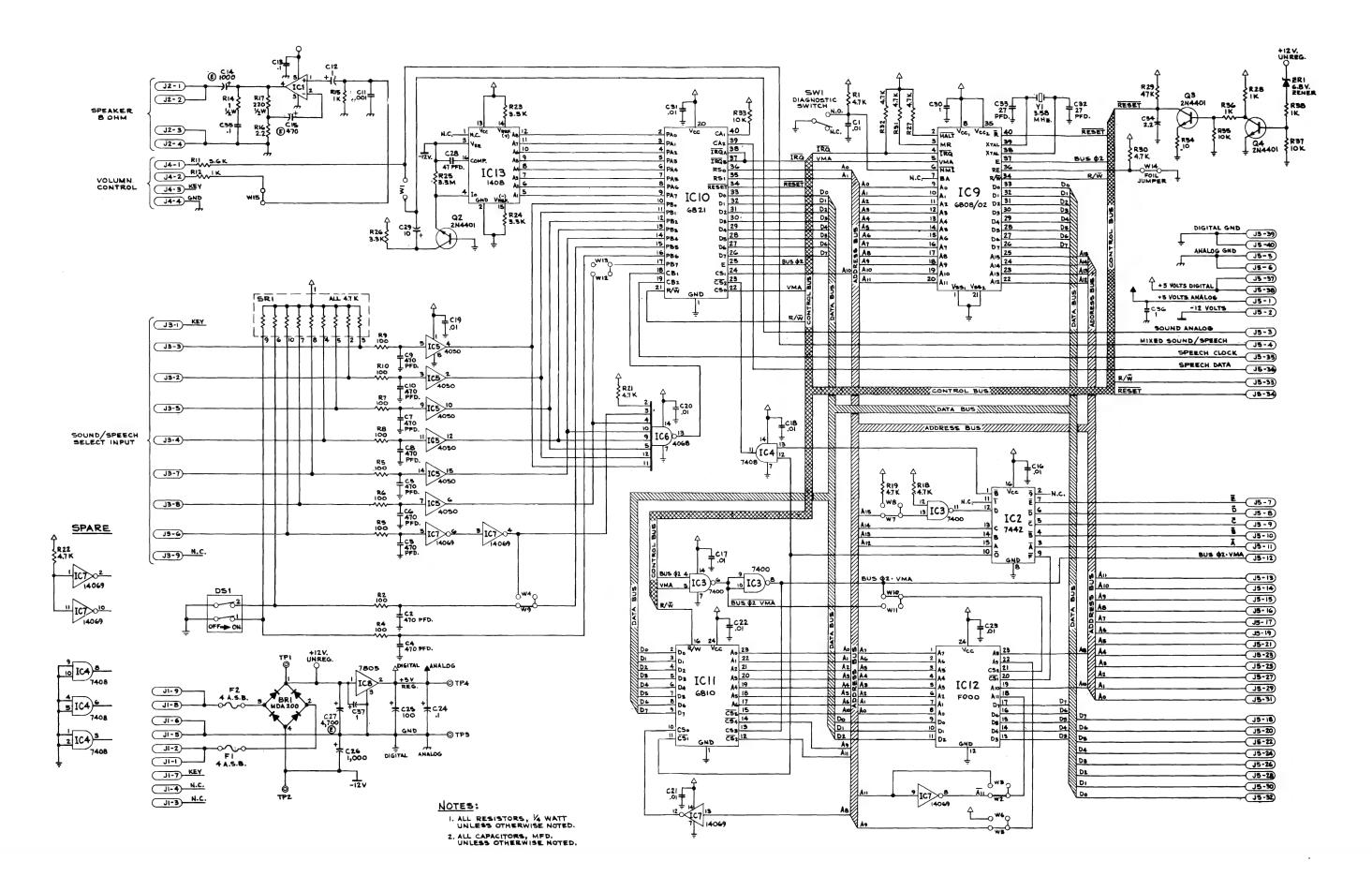
DIODES D1, D2, AND ZR1;

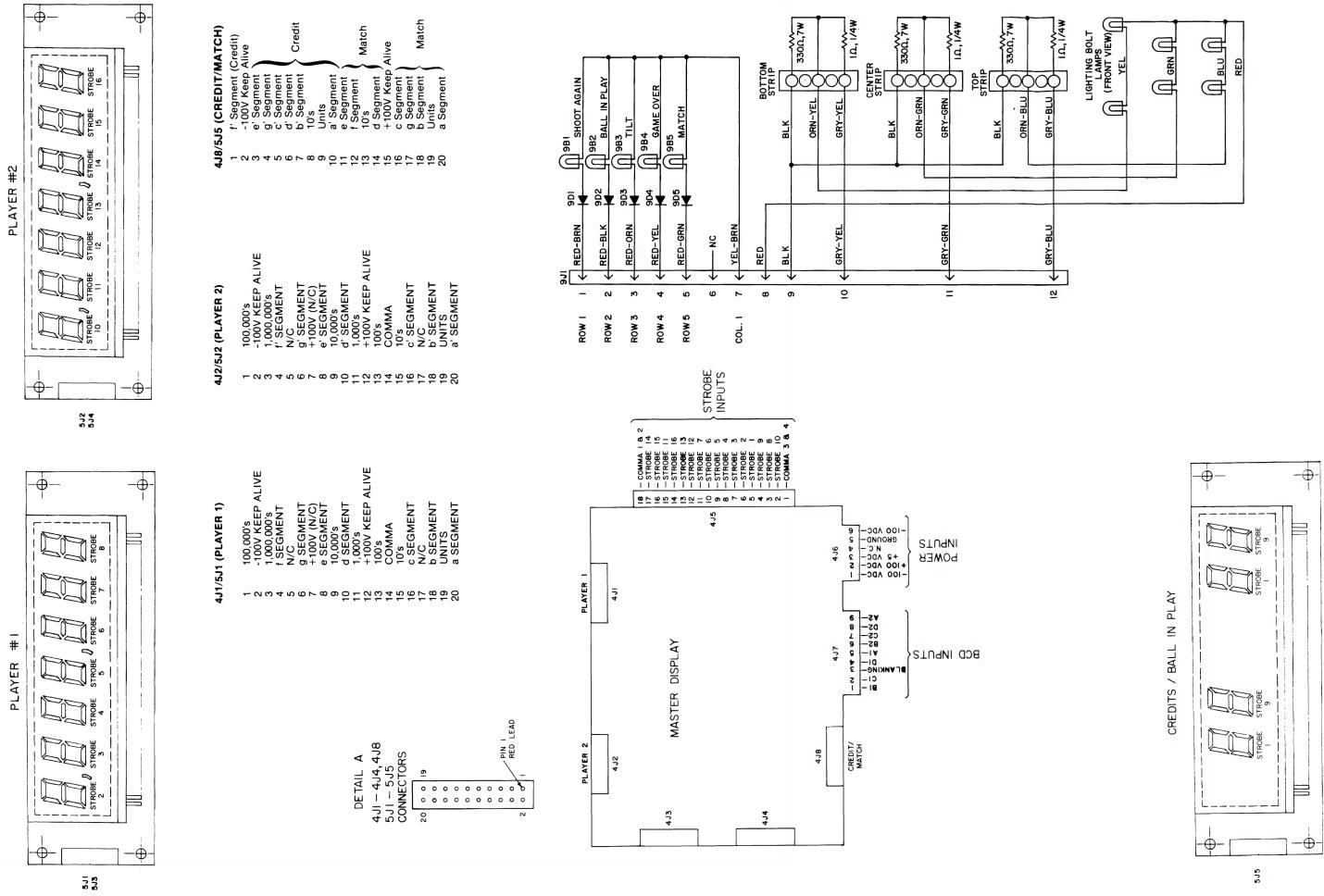
CAPACITORS C12, C14, C15, C25, C26, C27;

CONNECTORS 10J1, 10J2, 10J4, 10J3, 10J5;

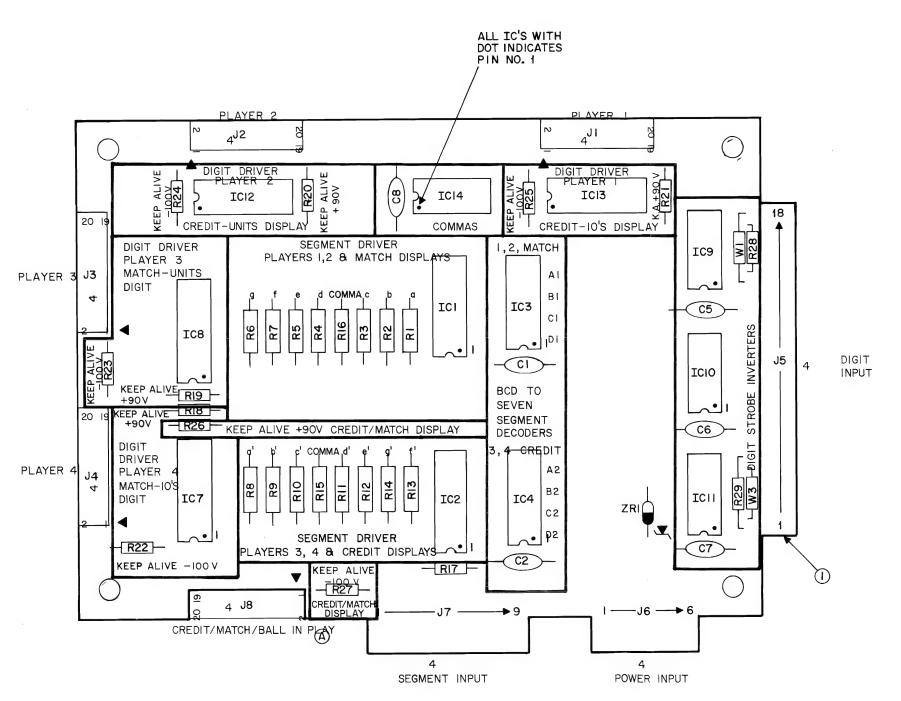
POSITION OF TRANSISTORS Q1, Q2, Q3, Q4.

5. JUMPERS W2) W5) W9)IN W10)





Insert Board Wiring Diagram

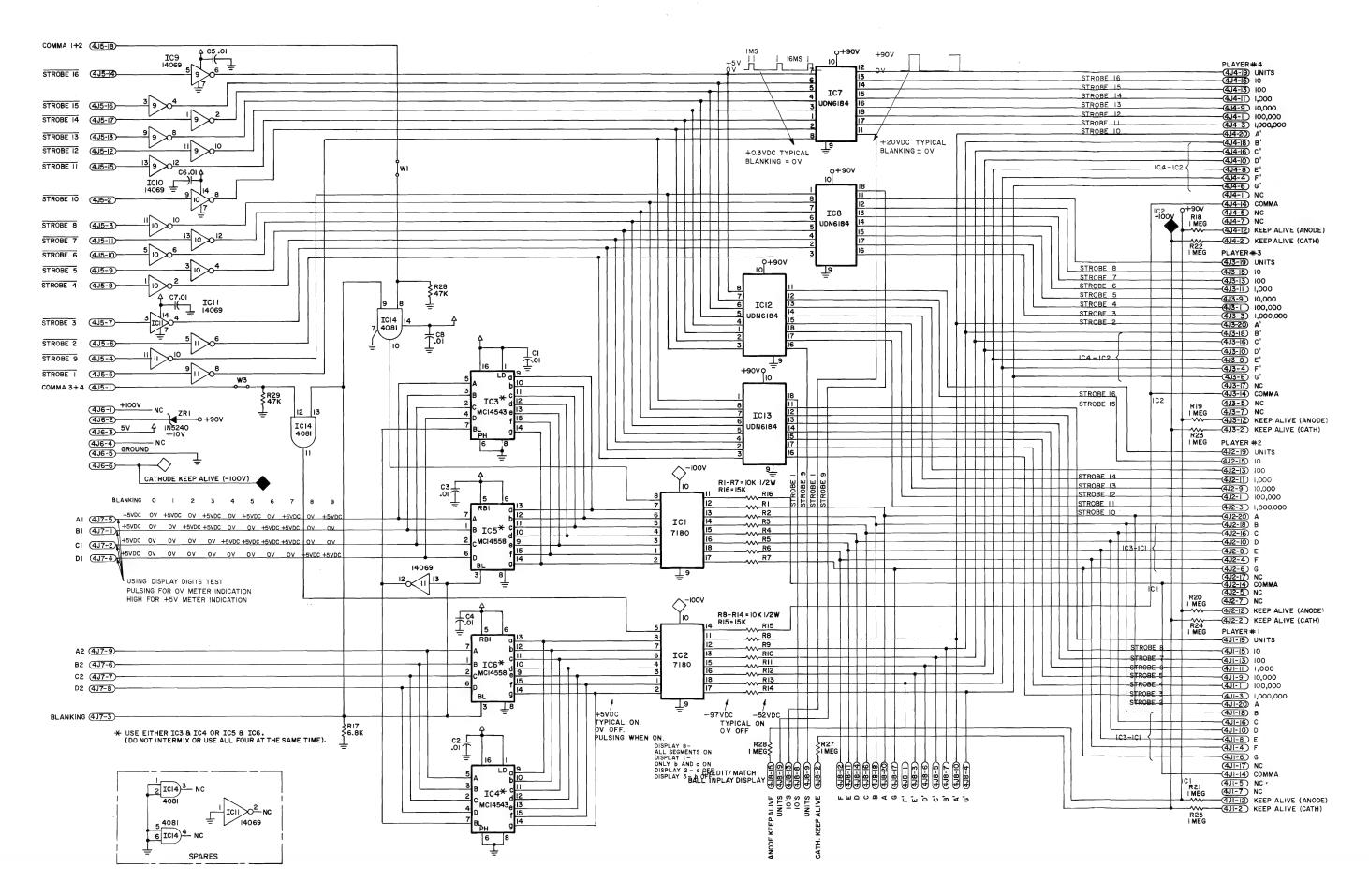


#### BILL OF MATERIAL

ITEM	PART	PART		REQ'D
NO •	NO.	DESIGNATION	DESCRIPTION	NO.
1	5760-09461		BARE P.C. BOARD	1
2	5310-08971	IC9, IC10, IC11	MC14069 HEX INVERTER	1 3
3	5310-08970	IC3, IC4	MC14543 BCD TO SEVEN SEGMENT LATCH/DECODER/DRIVER	2
4	5680-08969	IC1, IC2	UDN-7180 GAS DISCHARGE DISPLAY SEGMENT DRIVER	2
5,	5680-08968	IC7,IC8,IC12,IC13	UDN-6184A OR UDN-6118A GAS DISCHARGE DISPLAY SEGMENT DR	4
6	5310-09450	IC14	MC14081 QUAD 2-INPUT AND GATE	1
7	5010-08981	R1-R14	RESISTOR, FC, 10K OHM, 5%, 1/2 WATT	14
8	5075-09135	₹R1	IN4740A ZENER DIODE 10V, 5%, 1 WATT	1
9	5043-08980	C1,C2 C5 THRU C8	CAPACITOR, CERAMIC, 0.01 MFD., 50V, +80 -20%	6
10	5010-09035	R28, R29	RESISTOR, FC,47K OHM, 5%, 1/4 WATT	2
11	5010-09086	R17	RESISTOR, FC, 6.8K OHM, 5%, 1/4 WATT	1
12	5010-08982	R18 THRU R27	RESISTOR, FC, 3 MEG. OHM, 5%, 1/4 WATT	10
13	5791-09437	J1 THRU J4, J8	20 PIN RIBBON HEADER	5
14	5010-09149	R15, R16	RESISTOR, FC, 15K OHM, 5%, 1/2 WATT	2
15	5010-09534	W1, W3	RESISTOR, O OHM	2

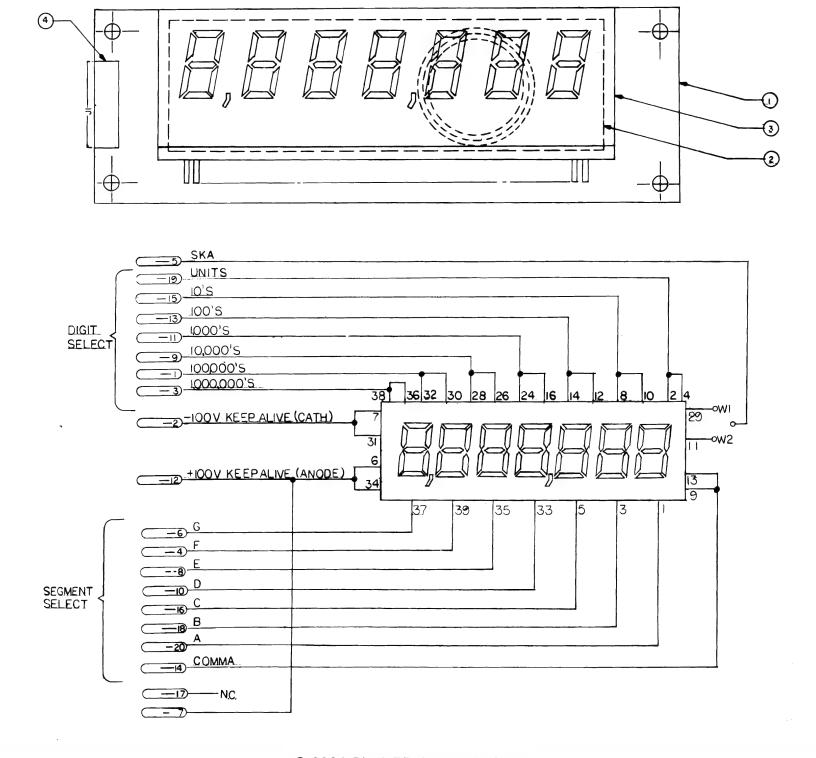
#### DIGIT CROSS REFERENCE

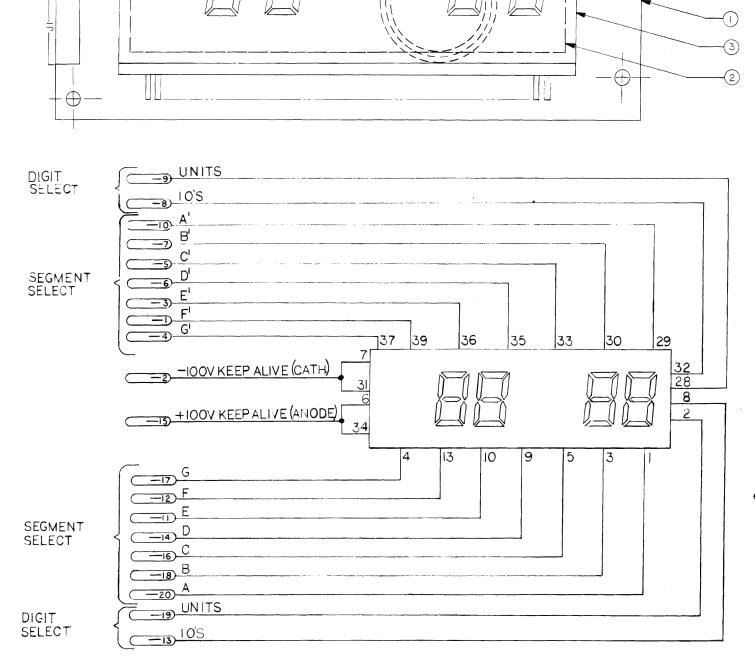
	7-SEGMENT	STROBE
DIGIT	DECODER/DRIVER	(DRIVER)
Credit 10's	IC4/IC2	1 (IC13)
Credit Units	IC4/IC2	9 (IC12)
Match 10's	IC3/IC1	1 (IC7)
Match Units	IC3/IC1	9 (IC8)
#1 1,000,000	IC3/IC1	2 (IC13)
#1 100,000's	IC3/IC1	3 (IC13)
#1 10,000's	IC3/IC1	4 (IC13)
#1 1,000's	IC3/IC1	5 (IC13)
#1 100's	IC3/IC1	6 (IC13)
#1 10's	IC3/IC1	7 (IC13)
#1 Units	IC3/IC1	8 (IC13)
#2 1,000,000's	IC3/IC1	10 (IC12)
#2 100,000's	IC3/IC1	11 (IC12)
#2 10,000's	IC3/IC1	12 (IC12)
#2 1,000's	IC3/IC1	13 (IC12)
#2 100's	IC3/IC1	14 (IC12)
#2 10's	IC3/IC1	15 (IC12)
#2 Units	IC3/IC1	16 (IC12)
#3 1,000,000's	IC4/IC2	2 (IC8)
#3 100,000's	IC4/IC2	3 (IC8)
#3 10,000's	IC4/IC2	4 (IC8)
#3 1,000's	IC4/IC2	5 (IC8)
#3 100's	IC4/IC2	6 (IC8)
#3 10's	IC4/IC2	7 (IC8)
#3 Units	IC4/IC2	8 (IC8)
#4 1,000,000's	IC4/IC2	10 (IC7)
#4 100,000's	IC4/IC2	11 (IC7)
#4 10,000's	IC4/IC2	12 (IC7)
#4 1,000's	IC4/IC2	13 (IC7)
#4 100's	IC4/IC2	14 (IC7)
#4 10's	IC4/IC2	15 (IC7)
#4 Units	IC4/IC2	16 (IC7)
#1 Comma	-/IC1	2,5 (IC13)
#2 Comma	-/IC2	10,13 (IC12)
#3 Comma	-/IC1	2,5 (IC8)
#4 Comma	-/IC2	10,13 (IC7)



	BILL OF MATERIAL				
ITEM	PART NO.	DESIGNATION	DESCRIPTION	REO'D.	
-	5762-09468-XP		SLAVE DISPLAY P.C. BOARD		
2	23-6645		DISPLAY MTG ADHESIVE FOAM	1	
3	5670-09438-XP		_7 DIGIT DISPLAY		
4	\$791-09436-XP	JI	20 PIN RIBBON HEADER		
5	03-7673-2		CAPLUG	1	

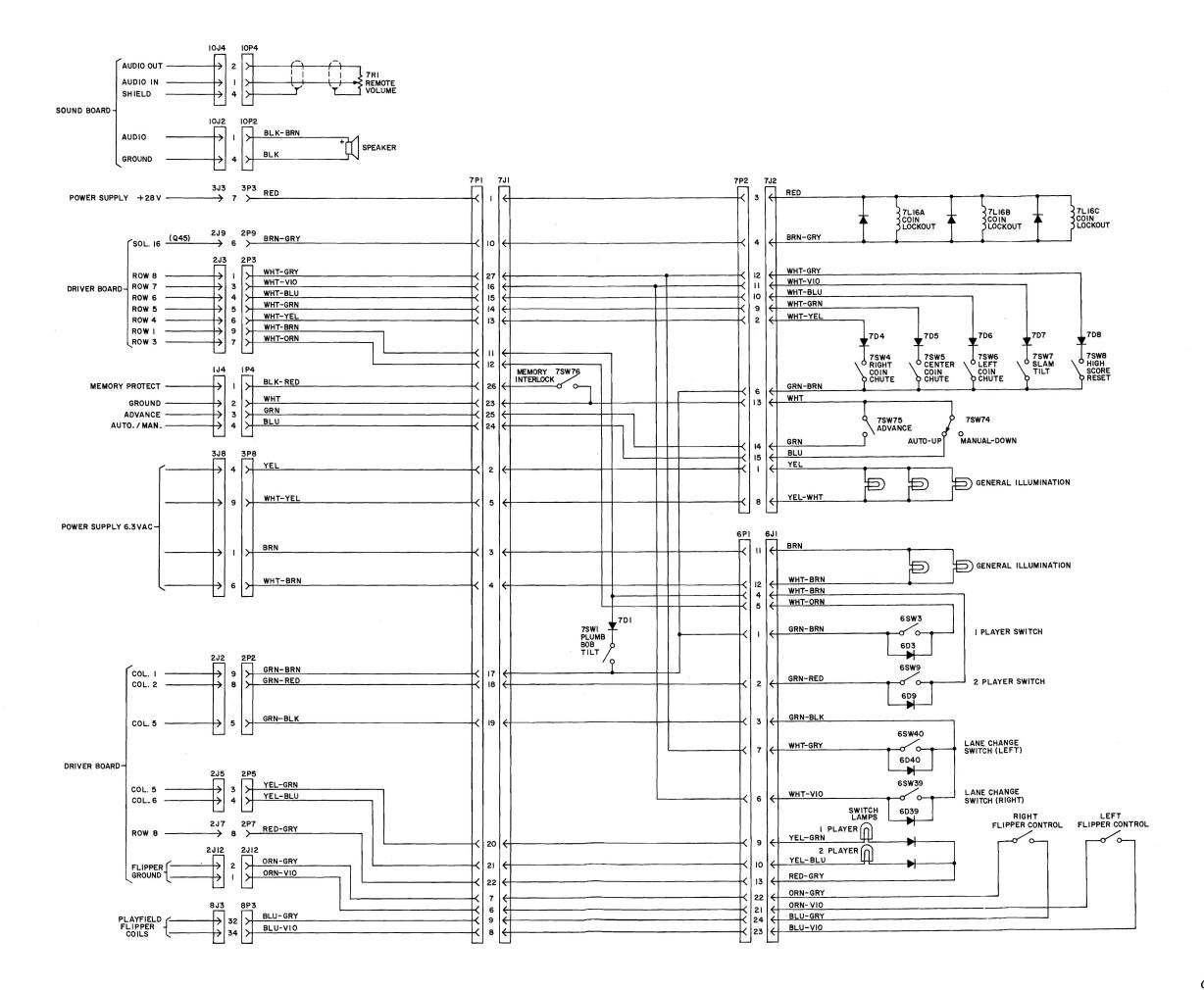
BILL OF MATERIAL				
ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	REQ' D
	5167-09468-00		CREDIT/MATCH SLAVE P.C. BOARD	i i
2	23-6545 -		FOAM DISPLAY - BACK	- 1
3	5670-09448-00		4 DIGIT DISPLAY	1
4	5791-09438-00	JI	20 PIN RIBBON HEADER	1
5	23-6546		FOAM DISPLAY-FRONT	1.3
6	03-1513-2		CAPLUG	1



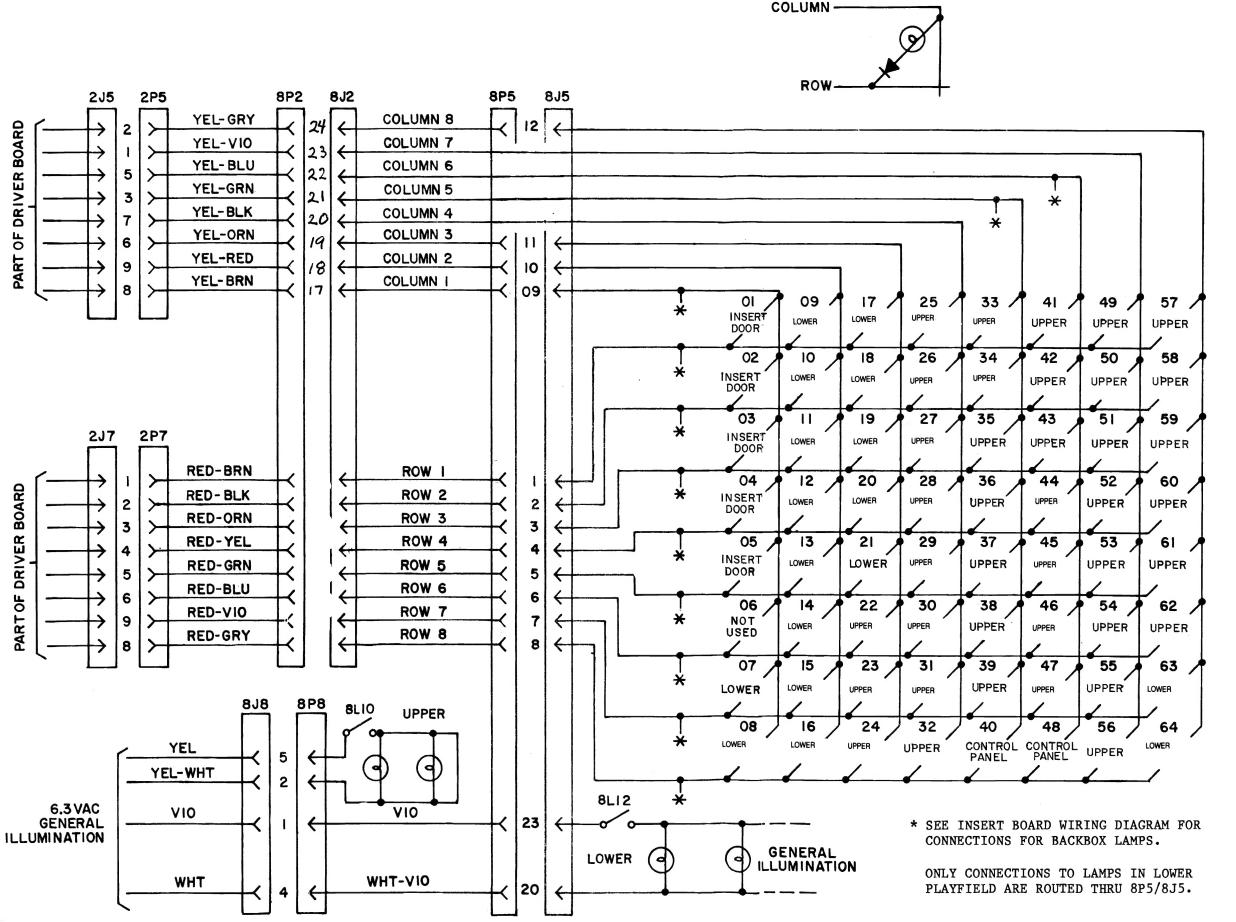


C 8364 PLAYER SLAVE DISPLAY

C 8365 CREDIT/MATCH SLAVE DISPLAY



TYPICAL



```
Lamp
No.
01
02
03
04
05
06
07
08
09
                              Function
Same Player Shoots Again
Ball in Play
                                    Game Over
                                   Match
Not Used
Arrow, LLP
                                      A Arrow, LLP
                                                   Bonus Multiplier, LLP
                             2X Bonus Multiplier, LLP

3X Bonus Multiplier, LLP

4X Bonus Multiplier, LLP

5X Bonus Multiplier, LLP

20 Bonus, LLP, (20,000)

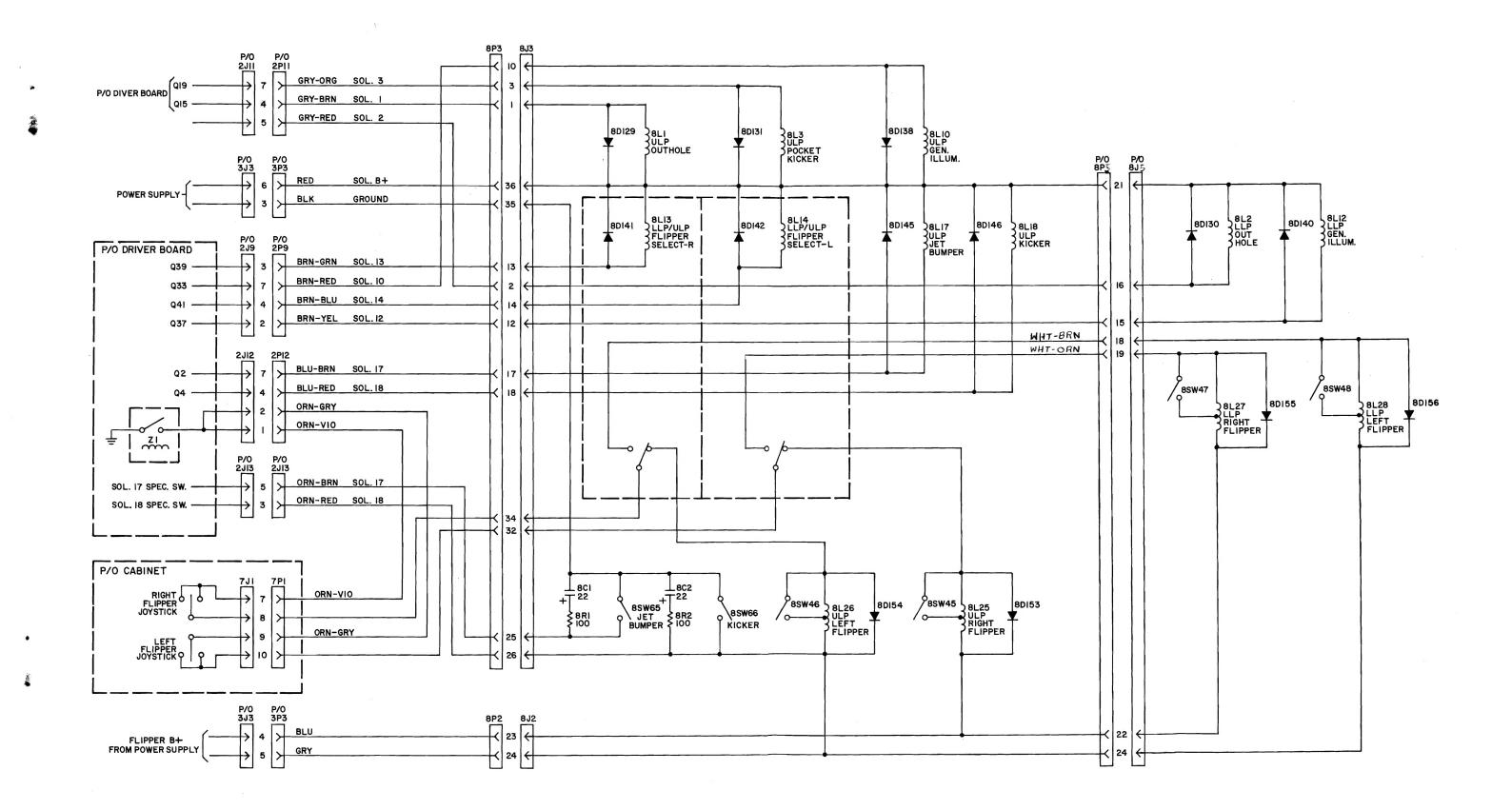
40 Bonus, LLP, (40,000)

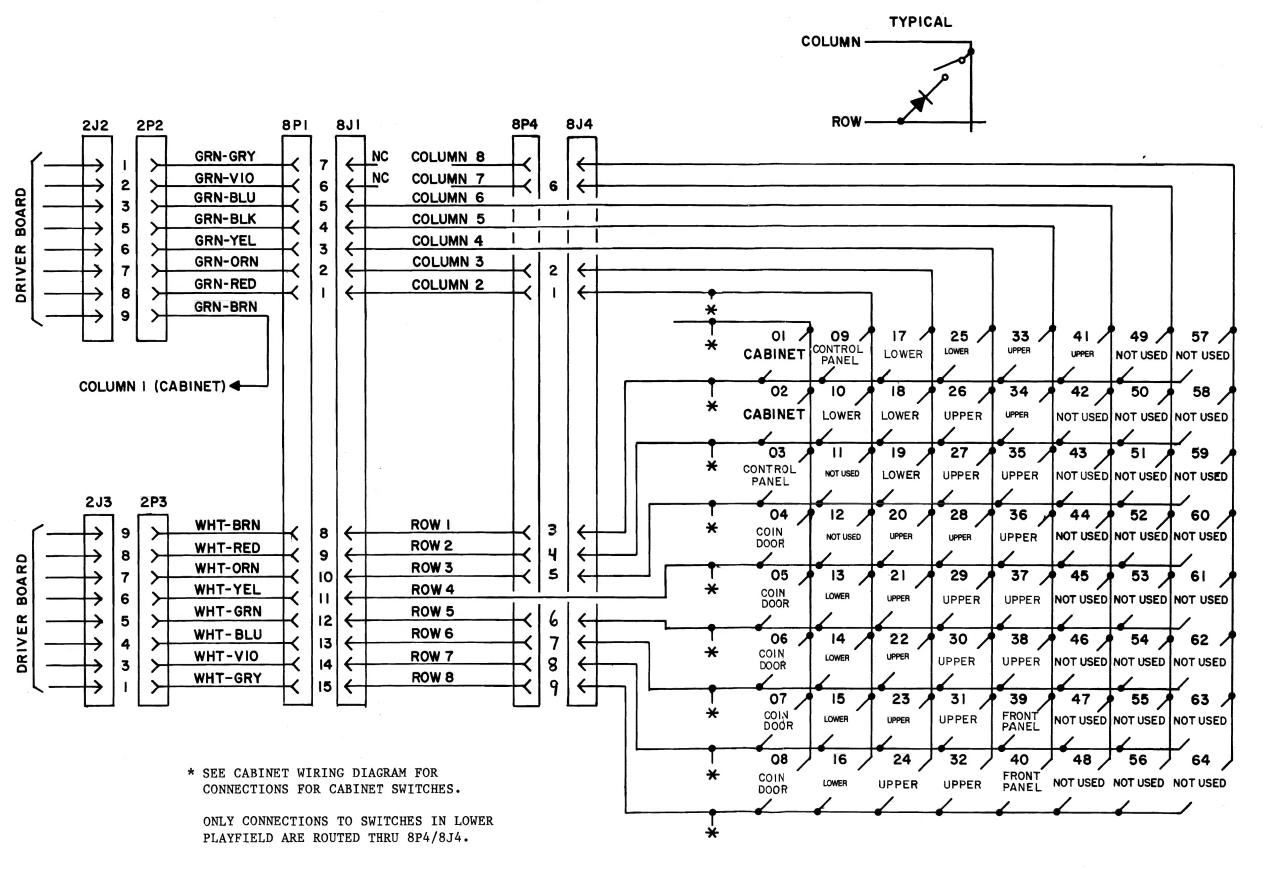
60 Bonus, LLP, (60,000)

80 Bonus, LLP, (80,000)

6 Target LLP
                             6 Target LLP
7 Target LLP
8 Target LLP
9 Target LLP
    10 Target LLP
5 Target ULP
                                4 Target
                        3 Target ULP
2 Target ULP
1 Target ULP
1 Target ULP
1 K Bonus, ULP
2 K Bonus, ULP
2 K Bonus, ULP
4 K Bonus, ULP
4 K Bonus, ULP
16 K Bonus, ULP
2 K Bonus Multiplier, ULP
3 K Bonus Multiplier, ULP
3 K Bonus Multiplier, ULP
4 K Bonus Multiplier, ULP
5 K Bonus Multiplier, ULP
1 Bonus Multiplier, ULP
1 Bumper 300, ULP
1 Lane Manner 3000, ULP
1 Lane A, ULP
1 Lane A, ULP
1 Lane V, ULP
2 Spinner 1000, ULP
3 Pleiver Start Button (Front Panel)
3 Pleiver Start Button (Front Panel)
4 C ULP
5 Spinner 1000, ULP
                               3 Target
                       N, ULP
Spinner 1000, ULP
2-Player Start Button (Front Panel)
Ramp Chamber Lane 5,000, ULP
Ramp Chamber Lane 10,000, UL-
P 51 Ramp Chamber Lane 15,00L0, ULP
Ramp Chamber Lane 20,000, ULP
Jet Bumper, ULP
Spinner Ramp, ULP (Nearest Spinner)
Spinner Ramp, ULP
                      Chamber)
Extra Ball 25,000, ULP
Left EYE Special, LLP
Right EYE Special, LLP
   NOTE:
LLP = Lower Level Playfield
ULP = Upper Level Playfield
```

\*Left and right determinations are made with Playfield removed from game (PLAY SIDE UP) and flippers closest to observer.





Switch

Function (Score)

Plumb Bob Tilt, Cabinet

Not Used

1-Player Start, Front Panel

Right Coin Chute, Coin Door Center Coin Chute, Coin Door

Left Coin Chute, Coin Door

Slam Tilt, Coin Door

High Score Reset, Coin Door 2-Player Start, Front Panel

Outhole/Eject, LLP

Not Used Not Used

B Standup Target, LLP (1000) A Standup Target, LLP (1000)

6 Standup Target, LLP (1000)

7 Standup Target, LLP (1000)

8 Standup Target, LLP (1000)

9 Standup Target, LLP (1000) 10 Standup Target, LLP (1000)

5 Standup Target, ULP (1000)

4 Standup Target, ULP (1000)

3 Standup Target, ULP (1000)

2 Standup Target, ULP (1000)

1 Standup Target, ULP (1000) Bull's-Eye Target (100/25,000/Extra Ball when lit)

Lane A Rollover, ULP (1000)

Lane V Rollover, ULP (1000)

26 27 28 29 30 Flipper Return Lane R Rollover (1000), ULP K Standup Target, ULP (1000) O Standup Target, ULP (1000)

N Standup Target, ULP (1000)

31 32 33 Spinner (1000 w/lit, 100 w/not lit), ULP Jet Bumper (lit value), ULP Ramp Chamber (lit value), ULP

Outhole/Eject, ULP

Top Left Standup Switch, ULP (10) Bottom Left Standup Switch, ULP (10)

\*38 Center Left Standup Switch, ULP (10)

Lane Change Right, Front Panel

Lane Change Left, Front Panel Right Side Kicker, ULP (10)

NOTE: LLP = Lower Level Playfield ULP = Upper Level Playfield

\*Left and right determinations are made with Playfield removed from game (PLAY SIDE UP) and flippers closest to observer.